UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,781	07/12/2001	Roberto Valtolina	Q65387	7736

7590 11/30/2004

SUGHRUE MION ZINN MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, NW
Washington, DC 20037-3213

EXAMINER	
LEE, ANDREW CHUNG CHEUNG	
ART UNIT	**PAPER NUMBER**
2664	

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/902,781	VALTOLINA ET AL.	
	Examiner	Art Unit	
	Andrew C Lee	2664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-13 and 15* is/are rejected.

7)☒ Claim(s) *6 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Fig. 2 (2/5 of Drawings), the reference terms "I" and "Q". Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

   a) Line numbering is missing for the disclosure; specification, abstract and claims.

   b) Page 3, lines 7 – 8, the sentence "feed-forward correction of the phase error to be carried out before computing the Discrete Fourier Transform (DFT)". The reference term "Discrete Fourier Transform (DFT)" is not consistent with

the term as disclosed in Fig. 3 and Fig.4. The Office requests the Applicant to provide clarification on this issue.

c) Page 4 to page 10, all the equations should be provided with reference numbering (for example ,

page 4, $X_i(t) = \sum_{K=0}^{N-1} X_{i,k}\ e^{j2\pi fkt}\ rect_{Ts}(t - iT_s)$ ..... eq (1))

d) Page 5, last line, the term IDFT $\{ X_{i.k} \}$ should be corrected as IFFT $\{ X_{i.k} \}$.

e) Page 6, the last sentence of the last paragraph, the reference term " Block D/A is an analog to digital converter" is not correct. The Office recommends that It should be "Block D/A is a digital to analog converter"

f) Page 7, line 9, the sentence "IFFT is a signal generation block that performs a fast Fourier transform;" should be corrected as "IFFT is a signal generation block that performs an Inverse Fast Fourier Transform".

g) Page 8, the Office would like the Applicant to provide more information on how a local replica of the pilot symbols, p(n) be generated regarding to the Fig. 3 and Fig. 4.

h) The Office would request the Applicant to provide the information on the relationship of I and Q channels on the transmit side related to the input signal $\{ X_{i.n} \}$ of the receive side.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 – 5, 7 – 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidl et al. (U.S. Patent No. 5732113) in view of Lee (U.S. Patent No. 6373861 B1).

Regarding Claims 1 and 9, Schmidl et al. discloses the limitation of a method and device for the carrier recovery in Orthogonal Frequency Division Multiplexing systems (column 1, lines 8 – 12), the method and device comprising of: at transmission side (Fig. 1, reference element 10, column 1, lines 38 – 41), receiving a signal to be retransmitted and performing an inverse discrete Fourier transform providing a number of pilot subcarriers to be transmitted together with subcarriers associated with the symbols of a certain constellation (column 1, lines 41 – 51; lines 52 – 60; column 2, lines 1 – 6), each symbol being associated with a block comprising a number of bits (column 1, lines 43 – 44); at reception side (Fig. 3, reference element 60), performing a discrete Fourier transform of the received signal (column 4, lines 34 – 38), wherein the method further comprises the steps of: arranging said pilot subcarriers in a contiguous/flanked manner inside the signal to be retransmitted ($\{x_{i,n}\}$) (column 40 – 46); Schmidl et al. does not disclose expressly step by band-pass filtering the received signal for extracting the flanked pilot subcarriers, thus obtaining a first filtered signal; and performing a feed-

forward correction of phase error by utilizing such extracted pilot subcarriers, said feed-forward correction step being carried out before performing said discrete Fourier transform. Lee discloses the limitation of step by band-pass filtering the received signal for extracting the flanked pilot subcarriers (Fig. 5, reference element 160), thus obtaining a first filtered signal (column 6, lines 58 – 59); and performing a feed-forward correction of phase error by utilizing such extracted pilot subcarriers (column 6, lines 59 –62), said feed-forward correction step being carried out before performing said discrete Fourier transform (Fig. 5, column 8, lines 51 – 57). It would have been obvious to modify Schmidl et al. to include a step by band-pass filtering the received signal for extracting the flanked pilot subcarriers, thus obtaining a first filtered signal; and performing a feed-forward correction of phase error by utilizing such extracted pilot subcarriers, said feed-forward correction step being carried out before performing said discrete Fourier transform such as that taught by Lee in order to provide a frequency synchronizing device for performing frequency synchronization using only the guard interval signal in a time domain in an OFDM/CDMA system.

Regarding Claims 2 and 10, Schmidl et al. discloses the limitation of a method and device according to claimed wherein it further comprises of subjecting the first filtered signal to a complex conjugate operation, thus obtaining a second signal (column 3, lines 57 – 61).

Regarding Claims 3 and 11, Schmidl et al. discloses the limitation of a method

and device according to claimed wherein it further comprises of: providing a local replica of pilot symbols (column 4, lines 1 – 3); and multiplying said second signal by the local replica of the pilot symbols, thus obtaining a third signal (column 4, lines 4 – 8).

Regarding Claims 4 and 12, Schmidl et al. discloses the limitation of a method and device according to claimed wherein it further comprises extracting phase information of the third signal through unit vector computation means, for obtaining a fourth signal (column 14, lines 45 – 58).

Regarding Claims 5 and 13, Schmidl et al. discloses the limitation of a method according to claimed wherein it further comprises the step of subsampling the extracted phase and performing a piecewise linear interpolation of the phase information for obtaining a fourth signal (column 16, lines 41 – 43; column 17, lines 7 – 16).

Regarding Claim 7, Schmidl et al. discloses the limitation of a method and device for the carrier recovery in Orthogonal Frequency Division Multiplexing systems (column 1, lines 8 – 12), Schmidl et al. does not disclose expressly a method according to claimed wherein it further comprises the additional step of shifting, at every OFDM symbol, a spectrum portion which is available for said pilot subcarriers. Lee discloses the limitation of a method according to claimed wherein it further comprises the additional step of shifting, at every OFDM symbol, a spectrum portion which is available for said pilot subcarriers (Fig. 5, element 165; column 7, lines 22 – 24). It would have

been obvious to modify Schmidl et al. to include a method according to claimed wherein it further comprises the additional step of shifting, at every OFDM symbol, a spectrum portion which is available for said pilot subcarriers such as that taught by Lee in order to provide a frequency synchronizing device for performing frequency synchronization using only the guard interval signal in a time domain in an OFDM/CDMA system.

5. Claims 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidl et al. (U.S. Patent No. 5732113) and Lee (U.S. Patent No. 6373861 B1).as applied to claims 1 -7 above, and further in view of Wesel et al. (U.S. Patent No. 6125150).

Regarding Claims 8 and 15, both Schmidl et al. and Lee fail to disclose the limitation of a method and device according to claimed wherein said received signal to be retransmitted is a radio signal in high-frequency point-to-point radio links. Wesel et al. discloses the limitation of a method and device according to claimed wherein said received signal to be retransmitted is a radio signal in high-frequency point-to-point radio links (column 2, lines 56 – 57). It would have been obvious to modify Schmidl et al. and Lee to include a method and device according to claimed wherein said received signal to be retransmitted is a radio signal in high-frequency point-to-point radio links by Wesel et al. in order to provide a transmission system having consistent and reliable performance over a wide variety of channels having the same capacity.

Allowable Subject Matter

6. Claims 6 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew C. Lee whose telephone number is (571) 272-3131. The examiner can normally be reached on Monday through Friday from 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wellington Chin can be reached on (571) 272-3134. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ACL 16 November 2004

Ajit Patel
Primary Examiner